International Egyptian Journal of Nursing Sciences and Research (IEJNSR)

Original Article

Biomedical Waste Product Management in Pediatric Units and Its Relation to the Occurrence of Occupational Health Hazards

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ABSTRACT

Background: Biomedical waste management is a vital component of the environmental protection process **Aim of the study:** To determine biomedical waste product management in pediatric units and its relation to the occurrence of occupational health hazards. **Research design:** A descriptive exploratory research design was utilized in the current study**. Subjects:** A convenient sample of 116 health care providers (physician, nurses, and housekeepers) were involved in the current study. Setting: The current study was carried out at Minia university hospital for obstetrics and pediatrics. **Data collection Tools:** three tools were used in this study, **Tool I:** knowledge about bio-medical waste management; **Tool II:** attitudes toward biomedical waste management; and **Tool III:** occupational health hazards questionnaire. **Results:** nearly half (48.1%) of the studied health care providers had poor knowledge regarding biomedical waste management, and the majority (83.3%) of them had a positive attitude toward it. Also, there was a fair negative correlation between health care providers' knowledge about biomedical waste product management on exposure to physical health hazards. **Conclusion:** Pediatric health care providers' knowledge about biomedical waste management need to improve to decrease their occupational health hazards. **Recommendation:** provide pediatric health care providers continued training to reduce their risk of occupational health hazards, mainly inorganic, psycho-social, organic, and physical health hazards.

Key words: Biomedical Waste, Health Care Providers, Occupational Health Hazard

Introduction

Biomedical waste management systems in most developing countries focus more on coming up with mere technical solutions to overcome complex solid waste causes. As a result of a study that complies with the theory of planned behavior, seek of information/awareness, intensive, cooperative waste governance, and beliefs are the identified influential factors for the performance of the solid waste management system as a result of a study that complies with the perceived behavioral controls as discussed in the theory of planned behavior. Accordingly, it is

recommended that local authorities and policymakers implement a comprehensive, strategic, stakeholder-oriented waste management system with the above-referenced findings as an essential driver of household behavior change toward waste management. (Arineitwe, 2019) & (Mathur et al., 2012).

Healthcare waste contains contaminated items such as needles, contaminated or non-contaminated blood, tissue, chemicals, medications, medical equipment, and radioactive materials. Approximately 80% of the overall healthcare waste consists of general

waste. Another 20% is considered poisonous or dangerous and must be disposed of with caution. About 16 billion injections are given each year globally; however, since not all needles and syringes are disposed of correctly, 16 million needles and syringes aren't discarded. The many forms of waste produced by hospitals include pathogenic germs, which may affect hospital patients, staff, and the general public.

Waste management has become an international issue, as some local actions might significantly impact other countries. Strategies to design, plan and operate a waste management system or program are essential to any country and even the world (World Conference on Waste Management, 2019 & Sarojini and Dhivya, 2019). It is as essential as a treatment plan for medical professionals (Singh et al., 2014).

Improper management of biomedical waste generated in health care facilities causes a direct health impact on the community, the health care workers, and the environment. Every day, a relatively large amount of potentially infectious and hazardous waste is generated in hospitals and facilities worldwide. Indiscriminate disposal of BMW or hospital waste and exposure to such waste pose a serious threat to the environment and human health that requires specific treatment and management prior to its final disposal. (Mathur et al., 2012 & Le Goff et al., 2019).

Infectious waste, pathological waste, chemicals, pharmaceuticals, genotoxic waste, radioactive waste, and nonhazardous or general waste are all hazards of biomedical waste (Pépin et al., 2014; WHO/UNICEF, 2015). Toxic exposures such as mercury poisoning and needlestick injuries may also lead to the spread of diseases. A higher risk of nosocomial infections is also possible. Improper waste management may result in a change in microbial ecology and an increase in antibiotic resistance (Woldearegay & Zelelew, 2021; Kumar et al., 2012).

Occupational health is defined as promoting and maintaining the highest degree of physical, mental, and social well-being of workers in all occupations, protecting workers in their employment from risk. At the same time, the hazard is defined as any risk that a nurse might be exposed at the hospital that can cause temporary or permanent damage to nurses' lives (Keorekile et al., 2015). Moreover, WHO (2007) defined a health hazard as property damage, loss of livelihood and services, and social, environmental, and economic disruption caused by a dangerous phenomenon, substance, human activity, or condition.

Healthcare workers encounter different hazards due to their activities even though their workplaces (hospitals, clinics, and laboratories) include but are not limited to sharp-related injuries, direct infection, stress assault from patients and their relatives, allergies, back pain, and other musculoskeletal injuries Shinde, et al., (2016). Therefore, health care facilities, like other high-risk workplaces, are characterized by a high level of exposure to hazard agents, which significantly endanger the health and lives of workers (WHO, 2007).

Waste management is essential because it prevents hospital waste handlers and scavengers from getting injured by sharp objects, helps prevent nosocomial infections, and prevents those who live near hospitals from being exposed to waste and harmful chemicals. At times, general public members in the vicinity of hospitals are also put at risk because of hazardous drugs, drugs that have been disposed of being repacked and sold by unscrupulous people without being washed first, which is a risk to air, water, and soil (Mathur et al., 2020).

Significance of the study:

Health care professionals, who work in concert with the health care team, have a significant duty in understanding hospital waste classifications, segregation, and proper disposal procedures in order to help cut down on nosocomial infections. Additionally, a lack of awareness and understanding of the health risks of garbage, an insufficient disposal infrastructure, and an absence of standards to properly dispose of trash present environmental dangers. Baral and Nepal Law (2018) & Alabama Department of Environmental Management, (2018). For decades, they have tackled difficult issues of trash processing and management. Setting up efficient waste management systems has proved to be challenging because of the heated arguments that occur while dealing with WM. (Yeomans, 2019).

Health care workers are vulnerable because to a lack of awareness and inadequate knowledge of generation, segregation, and disposal. If enough information about the health risks of biomedical waste, the proper attitude toward its disposal, and the practice of safety procedures are all used, the disposal of biomedical waste may be carried out safely. Biomedical waste management is a problem to hospitals because of the lack of focus on biomedical waste in underdeveloped nations (Sachin et al., 2021 & Sekar et al., 2018).

The production of dangerous biological waste comes from medical waste. Improper sanitation and a large population increase the importance of medical waste production and disposal. Medical centers, including hospitals, clinics, and treatment facilities, produce significant quantities of hazardous waste, and individuals risk exposure to deadly illnesses as a result. To prevent the spread of illness, it is essential to specify procedures for managing waste and how to manage it.

These range from infectious waste (15-25% of total healthcare waste), including chemical or pharmaceutical waste (3%), radioactive and cytotoxic waste (or broken thermometers), body part waste (1%), and sharps waste (1%). (Padmanabhan and Barik, 2019).

So, examining the relation between biomedical waste product management in pediatric units and the occurrence of occupational health hazards may reduce recurrent headache, back pain, fatigue, insomnia needle stick injury, and muscle wasting among the pediatric healthcare providers.

Aim of the study:

To determine biomedical waste product management in pediatric units and its relation to the occurrence of occupational health hazards.

Research questions:

o What is the levels knowledge and attitude of the health care providers about bio-medical waste?

o What is biomedical waste product management in pediatric units and its relation to the occurrence of occupational health hazards?

o What is the most occupational health hazard occurred among the health care providers?

Subjects and Method

Research design: A descriptive exploratory research design was utilized in the current study.

Subjects:

A convenient sample of all pediatric healthcare providers (n = 116), described as 11 physicians, 86 nurses, and 19 housekeepers.

Setting:

The current study was carried out at Minia university hospital for obstetrics and pediatrics, Minia

governorate, Egypt. This hospital is providing maternity and child care services for inpatient and outpatient that include pediatric, obstetric, gynecological, and also include delivery room, emergency, obstetric intensive care unit, pediatric unit, neonatal intensive care unit, and pediatric medical care unit. All units were included in the study in the Minia governorate (Because it is a university hospital that contains the best devices and the perfect medical staff at the level of Minia governorate, Egypt).

Data collection tools:

Data of the present study was collected through the utilization of three tools as follow:

Tool (1): bio-medical waste structure questionnaire: it consists of two parts.

First part: socio-demographic characteristics of the study subject as age, gender, experience, in-service training program.

Second part: bio-medical waste structured knowledge questionnaire: developed by the researchers to assess healthcare providers' knowledge about biomedical waste management It consisted of 24 MCQ questions divided into three sub-sections.

Sub-section I: Deals with general knowledge of biomedical waste management (9 items).

Sub-section II: Deals with knowledge in biomedical waste segregation (8 items).

Sub-section III: Deals knowledge of waste disposal (7 items).

Scoring system

The correct answer was given one score, the incorrect or didn't know the answer was given zero scores. If the total knowledge of health care providers < 60% is considered poor knowledge, from 60% -75% is

considered average knowledge, and more than 75% is considered good knowledge.

Tool (II): attitudes toward waste management scale: developed by **Rudraswamy et al., (2012)** as illustrated in their article. It consisted of 29 statements divided into four subscales as follow: condition of waste receptacles (16 statement's), segregation (4 statements), mutilation of recyclable waste (6 statements), and disinfection of plastic and sharps (3 statements)

Scoring system:

Five Likert scales were used to arrange data as the score of (5) strongly agree, (4) for agree, (3) for neutral, (2) for disagree, and (1) for strongly disagree. A total score of ≤ 60 was considered a negative attitude, and more than 60.0% was considered a high level of awareness.

Tool (III): Occupational health hazard Questionnaire: developed by **Keorekile et al., (2015)** as illustrated in their article**.** it consists of 30 items divided into three subscales as follow: occupational health hazards (17 items), which included physical hazard (4 items), biological hazards (6 items), chemical hazards (2 items), psycho-social hazards (5 items); second subscale: organic and inorganic disorders (8 items), and third subscale: compliance level of nurses towards written protocols meant to address occupational health hazards (5 items).

Scoring system:

Each occurrence of occupational health hazard scored as one score and did not occur for zero scores.

Tools validity and reliability

The tools were tested by a team of five nursing administration experts at Minia, and Ain Shams University affirmed its validity. Cronbach's alpha test was used to determine the degree, the same concept,

and correlate with one another. The internal consistency for tool I (part two), tool II, and tool III were 0.82, 0.84, and 0.86, respectively.

Pilot study:

After developing the tools and beginning the initial data collection, 12 health care providers (10%) participated in a pilot study. The pilot study aimed to test whether the study was feasible, the order in which the items were presented, and the preliminary tool's consistency and applicability, also used to measure the period it would take to complete the questionnaire, which came to 20 minutes. They were included with the key research participants. The process of the pilot study took two weeks (from15/3 to 30/3) in March 2020.

Ethical considerations:

The study ethical committee of Minia University's faculty of nursing provided their initial approval in writing (5-2020). The researcher met with the directors to introduce and discuss the study's aim, then met with all health care providers in the pediatric department to introduce and discuss the study's aim and decide the best time to meet the study participants and collect data. Nurses and all health care providers were told that any details gathered would be kept private and would have no bearing on their professional evaluation. we obtained written consent from each participant

Data collection procedure:

The official approvals were obtained from the medical and nursing administration of Minia University pediatric and obstetric hospitals. Prior to the collection of data, a formal letter was issued from the dean of postgraduate studies and research at the Faculty of Nursing, Minia University, and the approval of the ethical committee, submitted to medical and nursing administrations and the heads of the units for obtaining their permission and help to conduct the study. The

letters also listed the data needed for the study. Moreover, we obtained written consent from each participant. Before the nurses participate in this study, explained the nature, the aim, methods, and anticipated benefits of the study. The researchers informed the participation is voluntary and has the right to withdraw without giving any reasons. Before distributing the questionnaire, the researchers met the participants according to the time determined by the head of each department, introducing herself, and explained the purpose of the study and the components of the tools to the participants in the study setting.

Then, the researchers distributed the data collection tools to respondents individually in their workplace. The filling time for the questionnaire sheet took about 30 minutes. The researchers checked the completeness of each filled form after the participant filled it. Data collection was done during the morning, afternoon, and night shifts two days/week, from the beginning of April to the end of July 2020.

Statistical design:

Statistical analysis was done by using Statistical Package for the Social Science (SPSS 25.0). Quality control was done at the stages of coding and data entry. Data were presented using descriptive statistics in frequencies and percentages for qualitative variables and mean & standard deviation (SD) for a quantitative variable. A correlation coefficient test was also used between health care providers' knowledge and attitude toward occupational health hazards, and it considered statistical significance at $P < 0.05$.

Results

Table (1) Shows that; 63.6% of the studied physicians were aged between 20 – 30 years, female, and their year of experience ranged between one to five years, and 72.7% of them had a previous training

program. 54.7% of them aged between 20 – 30 years, 90.7% were female, and 39.5% of their year of experience ranged between six to ten years, and 51.2% had a previous training program. 68.4% of the studied housekeeper aged between 20 – 30 years and their year of experience ranged between one to five years, 84.2% were female, and 47.4% had a previous training program.

Table (2): Shows that; 81.8% of the studied physician had good general knowledge about BMW management, 63.6% & 54.5% of them had good knowledge about waste segregation, and disposal respectively. 20.9% had good general knowledge about BMW management, 16.3% & 33.7% of them had good knowledge about waste segregation, and disposal respectively. 36.8% had good general knowledge about BMW management. 21.1% of them had good knowledge about waste segregation and disposal respectively.

Table (3): Shows that; 81.8% of the studied physicians. 48.8% of the studied nurses and 26.3% of the studied housekeepers had good knowledge regarding waste management.

Table (4): Shows that; 81.8% of the studied physician, 83.7% of the studied nurses, and 78.9% of the studied housekeepers had a positive attitude toward waste management.

Table (5): Shows that; 90.9% and 81.8% of the studied physicians had recurrent headache and insomnia respectively, 90.9% of them had muscle twisting, 63.6% of the exposure to chemical substance as mercury, 36.4% of them was a smoker, and 63.6% of them had influenza disease. 81.4% and 94.2% of them had back pain and fatigue, respectively, 82.6%, 89.5%, 84.9% of them had needle stick injury, muscle twisting, exposure to patient fluids, 77.9% of the exposure to

chemical substance as mercury, 81.4% of them had a high level of anxiety, and 48.8% of them had influenza disease. 84.2% of them had back pain, 78.9%, 84.2%, 63.2% of them had needle stick injury, muscle twisting, exposure to patient fluids, and occupational health disease respectively, 31.6% of the exposure to chemical substance as mercury, 78.9% of them had a high level of anxiety, and 63.2% of the exposure to lung disease.

Table (6): Presents that; 59.5% of the studied health care providers had high physical hazards, 30.1% of them had high biological hazards, 33.6% of them had high chemical hazards, 84.5% of them had high psycho-social hazards, 68.6% of them had high organic hazard and 43.1% of them had inorganic hazard.

Table (7): Shows that; 24.1% of the studied health care providers used hazardous equipment, 81.9% of the known hospital policies to deal with hazards, 77.6% of them trained on occupational hazards, and 67.2% of them had enough knowledge about occupational health hazards.

Table (8): Shows that; there was a negative fair association between the studied health care providers' knowledge with their physical hazards but no association between their knowledge with others hazards or their attitude with occupational health hazard.

Table(1): Percentage distribution regarding demographic data of the health care providers (n = 116).

Demographic data	Physician (N= 11)		Nurses (N = 86)		Housekeepers (N= 19)	
	No.	%	No.	%	No.	%
Age/ year						
20 –	7	63.6	47	54.7	13	68.4
30 -	4	36.4	29	33.7	1	5.3
40 – 50	0	0.0	10	11.6	5	26.3
Mean ± SD						
Gender						
Male	4	36.4	8	9.3	3	15.8
Female	7	63.6	78	90.7	16	84.2
Years of experience						
1- 5	7	63.6	25	29.1	13	68.4
6 – 10	4	36.4	34	39.5	6	31.6
11- 15	0	0.0	27	31.4	0	.0
Mean ± SD						
Training program						

Demographic data	Physician (N= 11)		Nurses (N = 86)		Housekeepers (N= 19)	
	No.	%	No.	%	No.	%
No	3	27.3	42	48.8	10	52.6
Yes	8	72.7	44	51.2	9	47.4

Table (2): Percentage distribution regarding waste management knowledge of the health care providers (n = 116).

Waste management knowledge	Physician (N= 11)		Nurses (N = 86)		Housekeepers (N= 19)	
	No.	%	No.	%	No.	%
General knowledge						
Poor	1	9.1	32	37.2	9	47.4
Average	1	9.1	36	41.9	3	15.8
Good	9	81.8	18	20.9	7	36.8
Waste segregation						
Poor	1	9.1	14	16.3	10	52.6
Average	3	27.3	47	54.7	8	42.1
Good	7	63.6	25	29.1	1	5.3
Waste disposal						
Poor	3	27.3	22	25.6	6	31.5
Average	2	18.2	35	40.7	9	47.4
Good	6	54.5	29	33.7	4	21.1

Table (3): Percentage distribution regarding total biomedical waste management knowledge of the health care providers (n = 116).

Knowledge level	Physician (N= 11)		Nurses (N = 86)		Housekeepers (N= 19)	
	No.	%	No.	%	No.	%
Poor	0	.0	20	23.3	9	47.4
Average	2	18.2	24	27.9	5	26.3
Good	9	81.8	42	48.8	5	26.3

Table (4): Percentage distribution regarding the attitude of the health care providers toward waste management (n = 116).

Attitude level	Physician (N= 11)		Nurses (N = 86)		Housekeepers (N= 19)	
	No.	%	No.	%	No.	%
Negative	2	18.2	14	16.3	4	21.1
Positive	9	81.8	72	83.7	15	78.9

Table (5): Percentage distribution common occupational health hazards among health care providers (n = 116).

Occupational health hazards	Physician (N= 11)		Nurses (N = 86)		Housekeepers (N= 19)	
	No.	%	No.	%	No.	%
# Physical hazards						
Recurrent headache	6	54.5	38	44.2	6	31.6
Back pain	8	72.7	70	**81.4**	16	**84.2**
Fatigue	10	**90.9**	81	**94.2**	14	73.7
Feet diseases	2	18.2	52	60.5	6	31.6
Insomnia	9	**81.8**	35	40.7	3	15.8
Exposure to occupational health hazards	5	45.5	32	37.2	9	47.4

Occupational health hazards	Physician (N= 11)		Nurses (N = 86)		Housekeepers (N= 19)	
	No.	%	No.	%	No.	%
Personal protective equipment(PPE)	6	54.5	50	58.1	10	52.6
PPE training	5	45.5	59	68.6	11	57.9
# Biological hazards						
Needlestick injury	2	18.2	71	**82.6**	15	**78.9**
Muscle twisting	10	**90.9**	77	**89.5**	16	**84.2**
Exposure to patients fluid	3	27.3	73	**84.9**	12	**63.2**
Prevention after exposure to infectious diseases	7	63.6	64	74.4	4	21.1
Exposure to occupational health diseases	3	27.3	54	62.8	12	**63.2**
Hepatitis B laboratory investigation	1	9.1	20	23.3	6	31.6
Vaccination for infectious disease	6	54.5	18	20.9	3	15.8
# Chemical hazards						
Exposure to chemical substances, eg. Mercury	7	**63.6**	67	77.9	6	31.6
Exposure to abortion-related to anesthetics evaporations gases	2	18.2	8	**19.0**	3	15.8
# Psycho-social hazards						
Anxiety	3	27.3	70	**81.4**	15	**78.9**
Favorite night shift	2	18.2	38	44.2	6	31.6
Insomnia	9	**81.8**	35	40.7	3	15.8
Smoking	4	36.4	18	18.6	0	0.0
# Organic disorder						
Exposure to lung diseases	2	18.2	25	29.1	12	**63.2**
Pneumonia	1	9.1	18	20.9	6	31.6
Tuberculosis	3	27.3	35	40.7	5	26.3
Influenza	7	**63.6**	42	**48.8**	8	42.1

Table(6): Percentage distribution regarding occupational health hazards of the health care providers (n = 116).

Occupational health hazards	No.	%
Physical hazards		
Low	47	40.5
High	69	**59.5**
Biological hazards		
Low	38	32.8
Moderate	43	37.1
High	35	30.1
Chemical hazards		
Low	77	66.4
High	39	33.6
Psych-social hazard		
Low	4	3.4
Moderate	14	12.1

Occupational health hazards	No.	%
High	98	**84.5**
Organic hazard		
Low	36	31.4
High	80	**68.6**
Inorganic hazard		
Low	41	35.3
Moderate	25	21.6
High	50	43.1

Table (7): Percentage distribution of the health care providers' complain (n = 116).

Health care providers' complain	Yes		No	
	No.	%	No.	%
Use hazards equipment	28	24.1	88	75.9
Enough knowledge about occupation health hazards	78	67.2	38	32.8
Know hospital policies to deal with hazard	95	**81.9**	21	18.1
Training on occupational health hazards	90	**77.6**	26	22.4
There policy for dealing with occupational health hazards	88	**75.9**	28	24.1

Table (8): Correlation between health care providers knowledge and their attitude with occupational health hazards

Occupational health hazards	Total knowledge		Total attitude	
	r	P-value	r	P-value
Physical hazards	**-.320**	**.03***	-.017-	.865
Biological hazards	.101	.313	-.037-	.714
Chemical hazards	-.084-	.399	.064	.523
Psych-social hazard	.021	.835	-.090-	.370
Organic hazard	-.069-	.493	-.002-	.983
Inorganic hazard	.065	.515	.000	.999

Discussion

Healthcare providers must have biomedical waste management in their hospitals to reduce injuries from sharps, leading to infection, in all categories of hospital personnel and waste handlers, as well as waste handling and scavenging outside the hospital and at times the general public living near hospitals. "Disposable" that's been recycled by unscrupulous individuals who failed to even wash it before resale, while the discarded medicines have been recycled and repacked to sell to innocent customers (Mathur et al., 2020).

Regarding demographic data of the studied nurses, more than half of them aged between 20 – 30 years and had a previous training program, the most of them were female, more than one-third of them their year of experience ranged between six to ten years. This finding consisted with Golandaj and Kallihal (2020) assessed awareness, attitude, and practices of biomedical waste management amongst public healthcare staff in Karnataka, India & Abd-El-Azem et al., (2017) mentioned that; more than half of the studied nurses aged < 30 years with mean 30.7 + 6.7 years, the most of them was female, and near to half of the studied nurses their experiences > 5 years.

Concerning physicians' general knowledge about BMW management, most of them had average and good general knowledge about waste segregation, and more than two-thirds of them had about waste disposal. Concerning nurses general knowledge about BMW management, more than half of them had average and good general knowledge about it and waste disposal, and near to half of them about waste segregation.

This finding consistent with Golandaj and Kallihal (2020) assessed awareness, attitude, and practices of biomedical waste management amongst public healthcare staff in Karnataka, India, showed near to half of the respondents were aware of the correct categorization and segregation, Sobh et al., (2018) assessed knowledge and practice of staff nurses related to health care waste management in El-zohor hospital showed more than one-third of the studied nurses had satisfactory general knowledge about waste management and the majority of them regarding waste segregation.

Also, Bhattacharjee & Saha (2015) determined the status of knowledge, attitude, and practices regarding biomedical waste management among health care personnel in Gazipur, Bangladesh, reported that the knowledge level of doctors and nurses for biomedical waste management is better than other healthcare workers.

Regarding total knowledge of the health care providers toward waste management, most of the studied physicians, more than three-quarters of the studied nurses, and more than half of the studied housekeepers had good/ average knowledge regarding waste management.

This results in consistency with Rao et al., (2018) assessed the levels of knowledge, attitudes, and practices among doctors, postgraduates, interns, staff nurses, laboratory technicians, and housekeeping staff in the different departments of a tertiary care teaching hospital reported that near to three-quarters of studied nurses and more than half of the studied housekeeping had satisfactory knowledge and Sarkees, (2018) identified the nurses' level of knowledge related to the management of healthcare waste in the health care institutions of Duhok City showed that more than two-thirds of nurses showed a high level of knowledge regarding management of healthcare waste.

In addition, El-Naggar et al., (2017) assessed knowledge, attitude, and practice of health care workers regarding proper waste management mentioned that near to three-quarters of the studied nurses had adequate total knowledge, and Ali et al., (2016) identified the occupational health hazards to which the hospital waste workers were exposed in Al-Azhar University Hospitals reported that one-third of studied nurses worked at Al Hussein and Sayed Galal hospitals had good knowledge, and the minority of studied workers at Al Hussein and Sayed Galal hospitals had good knowledge respectively before health education.

Regarding the attitude of the health care providers toward waste management, the majority of the studied physician and nurses, more than three-quarters of the studied Housekeepers, had a positive attitude toward waste management.

This finding is consistent with Rao et al., (2018) mentioned that; near to three-quarters of studied nurses and more than half of the studied housekeeping had a positive attitude regarding biomedical waste management, and El-Naggar et al., (2017) mentioned the majority of the studied nurses had a positive attitude.

This finding is inconsistent with Woromogo et al., (2020) assessed knowledge, attitudes, and practices of healthcare workers regarding biomedical waste management at Biyem-Assi district hospital; Yaounde mentioned that most of the studied respondents had their level of attitudes was unfavorable.

Regarding organic diseases that occurred to the studied health care providers, the current study presented that the most common were influenza, tuberculosis, and different lung diseases. This finding is consistent with Barar and Kulkhestha (2015) reported that tuberculosis، pneumonia, whooping cough are common diseases spread due to improper waste management.

Concerning healthcare providers' complaints, more than three-quarters of them had previous training on occupational health hazards and knowing their policy for dealing with occupational health hazards. Also, the majority of them know hospital policies to deal with hazards.

Qasim et al., (2020) assessed the knowledge, attitude, and practices of healthcare workers regarding biomedical waste segregation at Mayo Hospital Lahore.Nearby to three-quarters of nurses had previous training on health hazards, most of the nurses know guidelines are available in the department to deal with hazards, and Golandaj and Kallihal (2020) showed that near to half of the nurses knew waste handlers and used hazard equipment.

The result of the current study presents that 59.5% of the studied health care providers had high physical hazards, 30.1% of them had high biological hazards, 33.6% of them had high chemical hazards, 84.5% of them had high psycho-social hazards, 68.6% of them had high organic hazard, and 43.1% of them had inorganic hazard.

The reason for increasing accidents related to biomedical waste management, especially workers, was due to insufficient knowledge towards waste categorization at the point of production, inattention to directives and rules pertaining to medical waste management, inadequate training, cognizance, inappropriate legal framework, and policy enforcement related to waste handling, and the insufficient knowledge on waste categories and processing of medical waste, and inadequate segregation of biomedical waste exposed healthcare staff and waste handlers as well as administration staff.

The current study is accorded to the study of Karenzi et al., (2019), explored occupational health risks associated with medical waste management practices among health professionals working in three district hospitals in Rwanda, reported that 56.5 % of respondents from Kibagabaga hospital, 26.8% from Masaka and 49.3% from Muhima Hospital reported that they experienced occupational health risks related to inadequate medical waste management at their workplaces. Some of those risks include the risk of infection and physical injuries.

Al-Khatib et al., (2020) identified in the field and communicated the occupational hazards that scavengers are exposed to in the Gaza Strip reported that waste pickers were requested to describe any health problem they faced during the last 12 months. More than 50% of the study sample answered that they were troubled by back pains, breathing issues, skin diseases, sore throat, and cough with high temperature. However, only 30% complained of intestinal diseases (diarrhea, constipation, and blood with stool), as Gogoi (2015) reported the common diseases affecting scavengers, namely eye irritation (88%), asthma (76%), cold, and cough (92%), fatigue (94%), stomach problems (20%), and back pain (96%).

Healthcare workers are at high risk of getting infections due to their exposure to medical waste, mainly blood-borne pathogens as accidental needle stick injuries, which can cause different types of hepatitis and HIV (Tadesse, Shimelis, 2016). Also, exposure to harmful chemicals and radioactive waste used in health settings may constitute health hazards to healthcare workers and people out of the hospital premises.

Karenzi et al., (2019) showed that 83 % of nurses had a high risk of being in contact with medical waste, and the risk of infection due to injuries from sharp waste was high. Another study done among health professionals in Teaching Hospitals in Tehran on occupational exposure to hazardous waste such as blood and body fluids indicated that more than 60.3% of the respondents confirmed their exposure to the risks related to medical waste (Malekahmadi and Yunesian, 2014).

Moreover, this result accorded to the potential risk to health care workers from handling infected sharps; 60 percent of them sustain an injury from sharps knowingly or unknowingly during various procedures. The practice of reheating the needle after use is the major factor for needle stick injuries. Through poor waste management practices, all health care workers (nurses, doctors, lab technicians), service personnel, rag pickers, and the general public are at risk of contracting infections while handling, storage, and treatment.

Incinerators operating at sub-optimal conditions are an added environmental and health hazard.

Padmanabhan and Barik (2019) studied about health hazards of medical waste and its disposal reported that biomedical waste is infectious; these include an infectious waste (15%–25% of total healthcare waste), among which are sharps waste (1%), body part waste (1%), chemical or pharmaceutical waste (3%), and radioactive and cytotoxic waste or broken thermometers (less than 1%)."

Concerning the correlation between health care providers' knowledge and their attitude with occupational health hazards, there was a negative fair association between the studied health care providers' knowledge with their physical hazards but no association between their knowledge with others hazards or their attitude with occupational health hazards.

This finding is the same line Akkajit et al., (2020) assessed the knowledge, attitude, and practice (KAP) of MWM among housekeepers in clinics located in Phuket Province in southern island importance of training regarding MWM must be overemphasized since incomplete or improper knowledge about MWM can have a negative impact on the environment. Also, Sachin et al., (2021) concluded that knowledge awareness of biomedical waste management, generation, segregation, and proper disposal is the need of the hour to reduce the injuries and health hazards related to biomedical waste.

Limitations of the study:

The research project described in this paper has only examined a small number of healthcare providers. To fully understand the views of healthcare workers about biomedical waste management, proper safety measures, and reporting procedures for health problems

that may arise from it, studies that include all healthcare employees and private hospitals and multispecialty clinics are suggested.

Conclusion:

The majority of the studied physician, nearly half of the studied nurses, and more than one-quarter of the studied housekeepers had good knowledge regarding waste management. The majority of them had a majority positive attitude toward waste management.

Regarding most common health hazards that occurred to the studied pediatric health care providers were recurrent headache, muscle twisting and insomnia, back pain, needle stick injury, and a high level of anxiety

Also, there was a negative fair association between the studied health care providers' knowledge with their physical hazards but no association between their knowledge with others hazards or their attitude with occupational health hazards.

Implication of the study

Because unmanaged hospital waste poses hazards to the human body through a variety of routes of exposure, it has important implications for the prevention of occupational health risks among health care providers. Unmanaged hospital waste results in ill health and economic loss as a result of the study's findings. Employees who handle hospital trash often get injuries and cut themselves accidentally when handling medical waste that contains sharps and needles, according to the National Institute of Health. Because of this, without proper medical waste disposal, this hazardous material contributes to the catastrophic effects of today's poor waste management systems, including soil contamination, water contamination, extreme weather caused by climate change, and air contamination, among other things, and has the

potential to cause harm. Staff members who are educated on the significance of medical waste disposal will be better equipped to establish a workplace that is safe for them, their patients, and the environment as a whole. However, the consequences extend well beyond the confines of the medical institution.

Recommendations: Provide pediatric health care providers continued training to decrease their risk of occupational health hazards especially inorganic, psycho-social, organic, and physical health hazards.

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